An Improved Structure of a Fixed and Turning Connecting Shaft

Background of the Invention

Conventional power driven tool for socket structure mainly includes two methods, one is by manual and the other is by electrical power. Electrical tools are usually connected to pneumatic power source to take advantage of the output of compression air to provide constant torque to achieve locking assignments. Pneumatic tools usually uses torque connecting shafts to output torque to achieve locking purpose.

Referring to Fig.1, conventional torque connecting shaft 91 having a protruded sleeving part 911 and a sleeving hole 912 disposed at each end of the shaft, for connecting to a pneumatic tool and for sleeving a socket. This type of conventional torque shaft can only work on a straight line and if the socket need to be locked is located away from the straight line, it will make it difficult to reach. Besides, when the torque connecting shaft 91 is connecting with the socket, the protruded sleeving part 911 engages with the socket. It is not convenient to adjust a steel ball 913, so that when sleeving with the socket, it will not be easy to operate speedily. Referring to Fig. 2, yet another conventional connecting shaft, it makes it convenient for a socket to sleeve on the shaft, but the protruded sleeving part can only be operated in straight direction and cannot turn in angles.

Referring to Figs. 3 and 4, another connecting shaft which allows a limited turning angle, a driven head is disposed at one end of the connecting shaft, a positioning ball is disposed on the driven head at a desirable location, a concave part is located between the driven head and the positioning ball. Referring to Fig. 3, in operation, the connecting shaft and the socket can be connected in straight manner, the socket can also turn within a limited angle on the connecting shaft as referring to Fig. 4. When in straight manner, the positioning ball can help to position the tool. But when it operates in the manner of angle turning, the connection between the connecting shaft and the socket depends only on a simple sleeving and insertion mechanism, there is no element to help on positioning, if the operating angle is not suitable for the assignment, the socket will easily fall apart from the connecting shaft. Even though the positioning ball can achieve positioning function when operating on straight manner, the socket can still detach from the connecting shaft when the force acting on the socket from a pneumatic tool is bigger than the positioning force of the ball. Thus will affect safety of using the tool.

Summary of the Invention

The present invention of an Improved Structure of a Fixed and Turning Connecting Shaft mainly comprises a connecting shaft and a socket, when the socket is sleeving on the connecting shaft, the socket can work on both straight and angle turning manners with stably positioning capability. It also allows

speedily switch between operating in straight and angle turning manners.

The present invention will become more fully understood by reference to the following detailed description thereof when read in conjunction with the attached drawings.

Brief Description of the Drawings

Fig. 1 is a perspective view of a conventional torque connecting shaft;

Fig. 2 is a sectional assembly view of another conventional connecting shaft;

Fig. 3 is a perspective view of a conventional connecting shaft operating in straight and fixed direction;

Fig. 4 is a perspective view of a conventional connecting shaft operating in angle turning manner;

Fig. 5 is a perspective exploded view of the present invention;

Fig. 6 is a sectional assembly view of the present invention;

Fig. 7 is a sectional assembly view of the present invention operating in straight and fixed direction;

Fig. 8 is a sectional assembly view of present invention operating in angle turning manner;

Fig. 9 is a sectional assembly view of another embodiment of the present invention;

Detailed Description of the Preferred Embodiment

Referring Figs. 5 to 8, the present invention of an Improved Structure of a Fixed and Turning Connecting Shaft mainly comprises a connecting shaft 10 for a pneumatic tool (not shown in the Figs.), and a speedily assembly 20 for connecting to the connecting shaft 10 at a suitable location.

The connecting shaft 10 is in longitudinal bar shape, its one end having a fixed connecting part 11 for connecting to a pneumatic tool with driven power, another end is a connecting part 12 for sleeving a socket 31, a shoulder 13 in corresponding to the socket 31 is disposed between the connecting part 12 and the connecting shaft 10. The fixed connecting part 11 is a hole itself for the axial part (not shown in the Figs.) of the pneumatic tool to connect with. The connecting part 12 is curve in shape, an axial hole 121 is disposed inside along its axis, ball holes 122 and 123 are disposed on each side of the connecting part 12 respectively and are connected with the axial hole 121. The ball holes 122 and 123 are for placing a first positioning steel ball 32 and a second positioning steel ball 33 respectively. The connecting shaft 10 having a groove hole 14 disposed near the connecting part 12 and is in perpendicularly to the axial hole 121, and is connected to the axial hole 121. A circular positioning groove 16 is also disposed on the connecting shaft 10 for a positioning rubber 15 to sleeve on. The function of the groove hole 14 is for assemble and positioning the speedily assembly 20. During manufacturing, the groove hole 14 is

formed by using a drill with large diameter in order to save cost.

The speedily assembly 20 comprises an axial rod 21, a sliding control element 22 and a positioning pivotal element 23. The axial rod 21 is inserted into the axial hole 121. First and second concave grooves 211 and 212 are disposed at one end of the axial rod 21 on two sides in corresponding to the ball holes 122 and 123 of the connecting part 12. The other end of the axial rod 21 having a pivotal hole 213 for the positioning pivotal element 23 to go through in corresponding to the groove hole 14, the pivotal hole 213 is for connecting with the sliding control element 22. Stopping parts 2111 and 2121 are extended from the first and second concave grooves 211 and 212 respectively, the stopping part 2111 is extended from the first concave groove 211 towards the fixed connecting part 11, while another stopping part 2121 is extended from the second concave groove 212 towards the connecting part 12.

The sliding control element 22 is a socket structure which can sleeve on the connecting shaft 10, and can slide on it. A pivotal hole 224 is disposed on the sliding control element 22 in corresponding to the groove hole 14 and is for the positioning pivotal element 23 to go through. Three positioning circular grooves 221, 222 and 223 are disposed on the inner circumference of the sliding control element 22, the three positioning circular grooves are next to each other. When the sliding control element 22 moves along the axis, the three

positioning circular grooves 221, 222 and 223 are pressed against the positioning rubber 15.

Accordingly, when the connecting shaft 10 is connected with the socket 31, the socket 31 is engaged and positioned safety and stably with the first or the second positioning steel balls 32 and 33 no matter if the socket 31 is operating in straight fixed direction or turning angle manner. The first and the second positioning steel balls 32 and 33 can easily rotate by moving the sliding control element 22 on it. Thus it provides a very simple and convenient operating means.

Referring to Fig. 7, when the connecting shaft 10 and the socket 31 are operating in straight and fixed direction, the sliding control element 22 will moves towards the user, so that the positioning rubber 15 engages with first positioning circular groove 221, so that the axial rod 21 will move at the same time, to make the stopping part 2111 of the first positioning circular groove 221 presses against the first positioning steel ball 32 to protruded from the first ball hole 122. to achieve the purpose of locking the socket 31. When taking off the socket 31, simply move sliding control element 22 backwards, to make the positioning rubber 15 engages with the second positioning circular groove 222.

Referring to Fig. 8, the connecting shaft 10 and the socket 31 are connected in an angle, the sliding control element 22 is

moved forwards, so that the positioning rubber 15 engages with the third positioning circular rove 223, and at the same time, the axial rod 21 is also being moved to make the stopping part 2121 of the second concave groove 212 presses against the second positioning steel ball 33to protruded from the second ball hole 123, so as to achieve the purpose of positioning the socket 31. The socket 31 can be turned in different angles. When taking off the socket 31, simply slide the sliding control element 22 so that the stopping rubber 15 engages with the second positioning circular groove 222 as shown in Fig. 6.

Accordingly, the present invention can improve the efficiency of usage and is safer because when the first and the second positioning steel balls 32 and 33 presses against the socket 31, the axial rod 21 responsible for moving and pressing against the two positioning steel balls 32 and 33 is positioned by the sliding control element 22. If the sliding control element 22 stays at its position, the two positioning steel balls 32 and 33 will not depart from their positions. Thus safety is greatly improved.

Referring to Fig. 9, the sliding control element 22 can also move in an opposite direction as described above. When the sliding control element 22 moves towards the user, the positioning rubber 15 is positioned at the third positioning circular groove 223, so that the socket 31 can operates in an angle manner.

On the contrary, if the sliding control element 22 moves forwards, the first positioning circular groove 221 engages with the positioning rubber 15, the socket 31 is operating in a straight and fixed direction. Furthermore, the stopping part 2111 of the first concave groove 211 extends in a direction that is away from the user, while the stopping part 2121 of the second concave groove 212 extends towards the user, therefore can provides convenience of usage.

Note that the specification relating to the above embodiment should be construed as exemplary rather than as limitative of the present invention, with many variations and modifications being readily attainable by a person of average skill in the art without departing from the spirit or scope thereof as defined by the appended claims and their legal equivalents.